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Petrus J.T. Dekker  
Marco A. van den Berg

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<151> 2005-03-31

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Ile Ile Asp Lys Leu Asp Tyr Ile Gln Gly Met Gly Phe Thr Ala Ile	
65 70 75 80	
tgg atc acc ccc gtt aca gcc cag ctg ccc cag acc acc gca tat gga	288
Trp Ile Thr Pro Val Thr Ala Gln Leu Pro Gln Thr Thr Ala Tyr Gly	
85 90 95	
gat gcc tac cat ggc tac tgg cag cag gat ata tac tct ctg aac gaa	336
Asp Ala Tyr His Gly Tyr Trp Gln Gln Asp Ile Tyr Ser Leu Asn Glu	
100 105 110	

aac tac ggc act gca gat gac ttg aag gcg ctc tct tcg gcc ctt cat	384
Asn Tyr Gly Thr Ala Asp Asp Leu Lys Ala Leu Ser Ser Ala Leu His	
115 120 125	
gag agg ggg atg tat ctt atg gtc gat gtg gtt gct aac cat atg ggc	432
Glu Arg Gly Met Tyr Leu Met Val Asp Val Val Ala Asn His Met Gly	
130 135 140	
tat gat gga gcg ggt agc tca gtc gat tac agt gtg ttt aaa ccg ttc	480
Tyr Asp Gly Ala Gly Ser Ser Val Asp Tyr Ser Val Phe Lys Pro Phe	
145 150 155 160	
agt tcc caa gac tac ttc cac ccg ttc tgt ttc att caa aac tat gaa	528
Ser Ser Gln Asp Tyr Phe His Pro Phe Cys Phe Ile Gln Asn Tyr Glu	
165 170 175	
gat cag act cag gtt gag gat tgc tgg cta gga gat aac act gtc tcc	576
Asp Gln Thr Gln Val Glu Asp Cys Trp Leu Gly Asp Asn Thr Val Ser	
180 185 190	
ttg cct gat ctc gat acc acc aag gat gtg gtc aag aat gaa tgg tac	624
Leu Pro Asp Leu Asp Thr Thr Lys Asp Val Val Lys Asn Glu Trp Tyr	
195 200 205	
gac tgg gtg gga tca ttg gta tcg aac tac tcc att gac ggc ctc cgt	672
Asp Trp Val Gly Ser Leu Val Ser Asn Tyr Ser Ile Asp Gly Leu Arg	
210 215 220	
atc gac aca gta aaa cac gtc cag aag gac ttc tgg ccc ggg tac aac	720
Ile Asp Thr Val Lys His Val Gln Lys Asp Phe Trp Pro Gly Tyr Asn	
225 230 235 240	
aaa gcc gca ggc gtg tac tgt atc ggc gag gtg ctc gac ggt gat ccg	768
Lys Ala Ala Gly Val Tyr Cys Ile Gly Glu Val Leu Asp Gly Asp Pro	
245 250 255	
gcc tac act tgt ccc tac cag aac gtc atg gac ggc gta ctg aac tat	816
Ala Tyr Thr Cys Pro Tyr Gln Asn Val Met Asp Gly Val Leu Asn Tyr	
260 265 270	
ccc att tac tat cca ctc ctc aac gcc ttc aag tca acc tcc ggc agc	864
Pro Ile Tyr Tyr Pro Leu Leu Asn Ala Phe Lys Ser Thr Ser Gly Ser	
275 280 285	
atg gac gac ctc tac aac atg atc aac acc gtc aaa tcc gac tgt cca	912
Met Asp Asp Leu Tyr Asn Met Ile Asn Thr Val Lys Ser Asp Cys Pro	
290 295 300	
gac tca aca ctc ctg ggc aca ttc gtc gag aac cac gac aac cca cgg	960
Asp Ser Thr Leu Leu Gly Thr Phe Val Glu Asn His Asp Asn Pro Arg	
305 310 315 320	
ttc gct tct tac acc aac gac ata gcc ctc gcc aag aac gtc gca gca	1008
Phe Ala Ser Tyr Thr Asn Asp Ile Ala Leu Ala Lys Asn Val Ala Ala	
325 330 335	



ttc atc atc ctc aac gac gga atc ccc atc atc tac gcc ggc caa gaa Phe Ile Ile Leu Asn Asp Gly Ile Pro Ile Ile Tyr Ala Gly Gln Glu 340 345 350	1056
cag cac tac gcc ggc gga aac gac ccc gcg aac cgc gaa gca acc tgg Gln His Tyr Ala Gly Gly Asn Asp Pro Ala Asn Arg Glu Ala Thr Trp 355 360 365	1104
ctc tcg ggc tac ccg acc gac agc gag ctg tac aag tta att gcc tcc Leu Ser Gly Tyr Pro Thr Asp Ser Glu Leu Tyr Lys Leu Ile Ala Ser 370 375 380	1152
gcg aac gca atc cgg aac tat gcc att agc aaa gat aca gga ttc gtg Ala Asn Ala Ile Arg Asn Tyr Ala Ile Ser Lys Asp Thr Gly Phe Val 385 390 395 400	1200
acc tac aag aac tgg ccc atc tac aaa gac gac aca acg atc gcc atg Thr Tyr Lys Asn Trp Pro Ile Tyr Lys Asp Asp Thr Thr Ile Ala Met 405 410 415	1248
cgc aag ggc aca gat ggg tcg cag atc gtg act atc ttg tcc aac aag Arg Lys Gly Thr Asp Gly Ser Gln Ile Val Thr Ile Leu Ser Asn Lys 420 425 430	1296
ggt gct tcg ggt gat tcg tat acc ctc tcc ttg agt ggt gcg ggt tac Gly Ala Ser Gly Asp Ser Tyr Thr Leu Ser Leu Ser Gly Ala Gly Tyr 435 440 445	1344
aca gcc ggc cag caa ttg acg gag gtc att ggc tgc acg acc gtg acg Thr Ala Gly Gln Gln Leu Thr Glu Val Ile Gly Cys Thr Thr Val Thr 450 455 460	1392
gtt ggt tcg gat gga aat gtg cct gtt cct atg gca ggt ggg cta cct Val Gly Ser Asp Gly Asn Val Pro Val Pro Met Ala Gly Gly Leu Pro 465 470 475 480	1440
agg gta ttg tat ccg act gag aag ttg gca ggt agc aag atc tgt agt Arg Val Leu Tyr Pro Thr Glu Lys Leu Ala Gly Ser Lys Ile Cys Ser 485 490 495	1488
agc tcg tga Ser Ser	1497

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 <212> PRT  
 <213> *Aspergillus niger*

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Phe	Leu	Leu	Thr	Asp	Arg	Phe	Ala	Arg	Thr	Asp	Gly	Ser	Thr	Thr	Ala	
	35						40					45				
Thr	Cys	Asn	Thr	Ala	Asp	Gln	Lys	Tyr	Cys	Gly	Gly	Thr	Trp	Gln	Gly	
	50					55					60					
Ile	Ile	Asp	Lys	Leu	Asp	Tyr	Ile	Gln	Gly	Met	Gly	Phe	Thr	Ala	Ile	
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Trp	Ile	Thr	Pro	Val	Thr	Ala	Gln	Leu	Pro	Gln	Thr	Thr	Ala	Tyr	Gly	
				85					90					95		
Asp	Ala	Tyr	His	Gly	Tyr	Trp	Gln	Gln	Asp	Ile	Tyr	Ser	Leu	Asn	Glu	
			100					105					110			
Asn	Tyr	Gly	Thr	Ala	Asp	Asp	Leu	Lys	Ala	Leu	Ser	Ser	Ala	Leu	His	
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Glu	Arg	Gly	Met	Tyr	Leu	Met	Val	Asp	Val	Val	Ala	Asn	His	Met	Gly	
	130					135					140					
Tyr	Asp	Gly	Ala	Gly	Ser	Ser	Val	Asp	Tyr	Ser	Val	Phe	Lys	Pro	Phe	
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Ser	Ser	Gln	Asp	Tyr	Phe	His	Pro	Phe	Cys	Phe	Ile	Gln	Asn	Tyr	Glu	
				165					170					175		
Asp	Gln	Thr	Gln	Val	Glu	Asp	Cys	Trp	Leu	Gly	Asp	Asn	Thr	Val	Ser	
			180					185					190			
Leu	Pro	Asp	Leu	Asp	Thr	Thr	Lys	Asp	Val	Val	Lys	Asn	Glu	Trp	Tyr	
		195					200					205				
Asp	Trp	Val	Gly	Ser	Leu	Val	Ser	Asn	Tyr	Ser	Ile	Asp	Gly	Leu	Arg	
	210					215					220					
Ile	Asp	Thr	Val	Lys	His	Val	Gln	Lys	Asp	Phe	Trp	Pro	Gly	Tyr	Asn	
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Lys	Ala	Ala	Gly	Val	Tyr	Cys	Ile	Gly	Glu	Val	Leu	Asp	Gly	Asp	Pro	
				245					250					255		
Ala	Tyr	Thr	Cys	Pro	Tyr	Gln	Asn	Val	Met	Asp	Gly	Val	Leu	Asn	Tyr	
			260					265					270			
Pro	Ile	Tyr	Tyr	Pro	Leu	Leu	Asn	Ala	Phe	Lys	Ser	Thr	Ser	Gly	Ser	
		275					280					285				
Met	Asp	Asp	Leu	Tyr	Asn	Met	Ile	Asn	Thr	Val	Lys	Ser	Asp	Cys	Pro	
	290					295					300					
Asp	Ser	Thr	Leu	Leu	Gly	Thr	Phe	Val	Glu	Asn	His	Asp	Asn	Pro	Arg	
305					310					315					320	
Phe	Ala	Ser	Tyr	Thr	Asn	Asp	Ile	Ala	Leu	Ala	Lys	Asn	Val	Ala	Ala	
				325					330					335		

Phe Ile Ile Leu Asn Asp Gly Ile Pro Ile Ile Tyr Ala Gly Gln Glu  
 340 345 350  
 Gln His Tyr Ala Gly Gly Asn Asp Pro Ala Asn Arg Glu Ala Thr Trp  
 355 360 365  
 Leu Ser Gly Tyr Pro Thr Asp Ser Glu Leu Tyr Lys Leu Ile Ala Ser  
 370 375 380  
 Ala Asn Ala Ile Arg Asn Tyr Ala Ile Ser Lys Asp Thr Gly Phe Val  
 385 390 395 400  
 Thr Tyr Lys Asn Trp Pro Ile Tyr Lys Asp Asp Thr Thr Ile Ala Met  
 405 410 415  
 Arg Lys Gly Thr Asp Gly Ser Gln Ile Val Thr Ile Leu Ser Asn Lys  
 420 425 430  
 Gly Ala Ser Gly Asp Ser Tyr Thr Leu Ser Leu Ser Gly Ala Gly Tyr  
 435 440 445  
 Thr Ala Gly Gln Gln Leu Thr Glu Val Ile Gly Cys Thr Thr Val Thr  
 450 455 460  
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 Arg Val Leu Tyr Pro Thr Glu Lys Leu Ala Gly Ser Lys Ile Cys Ser  
 485 490 495

Ser Ser

<210> 15  
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 <212> DNA  
 <213> *Aspergillus niger*

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 ataaatgaaa gcacgcatgt atcagcctaa tagccgagtg gcgggcatct ctggcggcct 180  
 cccgagcagc gtggaatgcg tccaagatcc cgtccgcggg tcgtccttcg gtcggaatga 240  
 tgactggagc agcagacgat gtcctgagct gaatgcatgt gatattcaca ttccagggag 300  
 aattgtcggc tatttagaac cctctcggct taaaagccct attagactat ggggtgcgctc 360  
 aagccactag ccaggatata cgcctgaacg ctccatcacc ttgcagctga agtgcaacat 420  
 gggacgggct ttaacttttc gtagatataa gtttaattta tcctctccac acccataggg 480  
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 cgtattcagt taacagtcag tagtcccgtg tcggagattt gttgttctgc aacaattaaa 720  
 ggggaccagg gttaaatacct ggcccccgaa ctgatcggag ttctcgccaa tgagagatgt 780  
 tgtatacccc cgttcctggc agatggatta attgccggct ccatttggca tccatcaagc 840  
 atcatacggg attagaaggg tagttcgtgg gttgatctgc cgtgcaagggt gctcaaggct 900  
 ctggagtcac gctgaacgca aatatttaag aatcgtcgtc agggacagcg ttctctggat 960  
 agtcaagctg tgcttgggac gctgttctgt cgctttgtca aaacataatt cgcagcgatg 1020  
 agattatcga cttcagagtct cttcctttcc gtgtctctgc tggggaagct ggccctcggg 1080



aag ctg gcc ctc ggg ctg tcg gct gca gaa tgg cgc act cag tcg att	96
Lys Leu Ala Leu Gly Leu Ser Ala Ala Glu Trp Arg Thr Gln Ser Ile	
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tac ttc cta ttg acg gat cgg ttc ggt agg acg gac aat tcg acg aca	144
Tyr Phe Leu Leu Thr Asp Arg Phe Gly Arg Thr Asp Asn Ser Thr Thr	
35 40 45	
gct aca tgc gat acg ggt gac caa atc tat tgt ggt ggc agt tgg caa	192
Ala Thr Cys Asp Thr Gly Asp Gln Ile Tyr Cys Gly Gly Ser Trp Gln	
50 55 60	
gga atc atc aac cat ctg gat tat atc cag ggc atg gga ttc acg gcc	240
Gly Ile Ile Asn His Leu Asp Tyr Ile Gln Gly Met Gly Phe Thr Ala	
65 70 75 80	
atc tgg atc tcg cct atc act gaa cag ctg ccc cag gat act gct gat	288
Ile Trp Ile Ser Pro Ile Thr Glu Gln Leu Pro Gln Asp Thr Ala Asp	
85 90 95	
ggt gaa gct tac cat gga tat tgg cag cag aag ata tac gac gtg aac	336
Gly Glu Ala Tyr His Gly Tyr Trp Gln Gln Lys Ile Tyr Asp Val Asn	
100 105 110	
tcc aac ttc ggc act gca gat gac ctc aag tcc ctc tca gat gcg ctt	384
Ser Asn Phe Gly Thr Ala Asp Asp Leu Lys Ser Leu Ser Asp Ala Leu	
115 120 125	
cat gcc cgc gga atg tac ctc atg gtg gac gtc gtc cct aac cac atg	432
His Ala Arg Gly Met Tyr Leu Met Val Asp Val Val Pro Asn His Met	
130 135 140	
ggc tac gcc ggc aac ggc aac gat gta gac tac agc gtc ttc gac ccc	480
Gly Tyr Ala Gly Asn Gly Asn Asp Val Asp Tyr Ser Val Phe Asp Pro	
145 150 155 160	
ttc gat tcc tcc tcc tac ttc cac cca tac tgc ctg atc aca gat tgg	528
Phe Asp Ser Ser Ser Tyr Phe His Pro Tyr Cys Leu Ile Thr Asp Trp	
165 170 175	
gac aac ttg acc atg gtc caa gat tgt tgg gag ggt gac acc atc gta	576
Asp Asn Leu Thr Met Val Gln Asp Cys Trp Glu Gly Asp Thr Ile Val	
180 185 190	
tct ctg cca gac cta aac acc acc gaa act gcc gtg aga aca atc tgg	624
Ser Leu Pro Asp Leu Asn Thr Thr Glu Thr Ala Val Arg Thr Ile Trp	
195 200 205	
tat gac tgg gta gcc gac ctg gta tcc aat tat tca gtc gac gga ctc	672
Tyr Asp Trp Val Ala Asp Leu Val Ser Asn Tyr Ser Val Asp Gly Leu	
210 215 220	
cgc atc gac agt gtc ctc gaa gtc gaa cca gac ttc ttc ccg ggc tac	720
Arg Ile Asp Ser Val Leu Glu Val Glu Pro Asp Phe Phe Pro Gly Tyr	
225 230 235 240	

cag gaa gca gca ggt gtc tac tgc gtc ggc gaa gtc gac aac ggc aac	768
Gln Glu Ala Ala Gly Val Tyr Cys Val Gly Glu Val Asp Asn Gly Asn	
245 250 255	
cct gcc ctc gac tgc cca tac cag aag gtc ctg gac ggc gtc ctc aac	816
Pro Ala Leu Asp Cys Pro Tyr Gln Lys Val Leu Asp Gly Val Leu Asn	
260 265 270	
tat ccg atc tac tgg caa ctc ctc tac gcc ttc gaa tcc tcc agc ggc	864
Tyr Pro Ile Tyr Trp Gln Leu Leu Tyr Ala Phe Glu Ser Ser Ser Gly	
275 280 285	
agc atc agc aac ctc tac aac atg atc aaa tcc gtc gca agc gac tgc	912
Ser Ile Ser Asn Leu Tyr Asn Met Ile Lys Ser Val Ala Ser Asp Cys	
290 295 300	
tcc gat ccg aca cta ctc ggc aac ttc atc gaa aac cac gac aat ccc	960
Ser Asp Pro Thr Leu Leu Gly Asn Phe Ile Glu Asn His Asp Asn Pro	
305 310 315 320	
cgt ttc gcc tcc tac acc tcc gac tac tcg caa gcc aaa aac gtc ctc	1008
Arg Phe Ala Ser Tyr Thr Ser Asp Tyr Ser Gln Ala Lys Asn Val Leu	
325 330 335	
agc tac atc ttc ctc tcc gac ggc atc ccc atc gtc tac gcc ggc gaa	1056
Ser Tyr Ile Phe Leu Ser Asp Gly Ile Pro Ile Val Tyr Ala Gly Glu	
340 345 350	
gaa cag cac tac tcc ggc ggc aag gtg ccc tac aac cgc gaa gcg acc	1104
Glu Gln His Tyr Ser Gly Gly Lys Val Pro Tyr Asn Arg Glu Ala Thr	
355 360 365	
tgg ctt tca ggc tac gac acc tcc gca gag ctg tac acc tgg ata gcc	1152
Trp Leu Ser Gly Tyr Asp Thr Ser Ala Glu Leu Tyr Thr Trp Ile Ala	
370 375 380	
acc acg aac gcg atc cgc aaa cta gcc atc tca gct gac tcg gcc tac	1200
Thr Thr Asn Ala Ile Arg Lys Leu Ala Ile Ser Ala Asp Ser Ala Tyr	
385 390 395 400	
att acc tac gcg aat gat gca ttc tac act gac agc aac acc atc gca	1248
Ile Thr Tyr Ala Asn Asp Ala Phe Tyr Thr Asp Ser Asn Thr Ile Ala	
405 410 415	
atg cgc aaa ggc acc tca ggg agc caa gtc atc acc gtc ctc tcc aac	1296
Met Arg Lys Gly Thr Ser Gly Ser Gln Val Ile Thr Val Leu Ser Asn	
420 425 430	
aaa ggc tcc tca gga agc agc tac acc ctg acc ctc agc gga agc ggc	1344
Lys Gly Ser Ser Gly Ser Ser Tyr Thr Leu Thr Leu Ser Gly Ser Gly	
435 440 445	
tac aca tcc ggc acg aag ctg atc gaa gcg tac aca tgc aca tcc gtg	1392
Tyr Thr Ser Gly Thr Lys Leu Ile Glu Ala Tyr Thr Cys Thr Ser Val	
450 455 460	



acc	gtg	gac	tcg	agc	ggc	gat	att	ccc	gtg	ccg	atg	gcg	tcg	gga	tta	1440
Thr	Val	Asp	Ser	Ser	Gly	Asp	Ile	Pro	Val	Pro	Met	Ala	Ser	Gly	Leu	
465					470					475					480	

ccg	aga	gtt	ctt	ctg	ccc	gcg	tcc	gtc	gtc	gat	agc	tct	tcg	ctc	tgt	1488
Pro	Arg	Val	Leu	Leu	Pro	Ala	Ser	Val	Val	Asp	Ser	Ser	Ser	Leu	Cys	
			485					490						495		

ggc	ggg	agc	gga	aga	tta	tac	gtc	gag	taa							1518
Gly	Gly	Ser	Gly	Arg	Leu	Tyr	Val	Glu								
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 <212> PRT  
 <213> *Aspergillus niger*

<400> 17																
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Lys	Leu	Ala	Leu	Gly	Leu	Ser	Ala	Ala	Glu	Trp	Arg	Thr	Gln	Ser	Ile	
			20					25					30			
Tyr	Phe	Leu	Leu	Thr	Asp	Arg	Phe	Gly	Arg	Thr	Asp	Asn	Ser	Thr	Thr	
		35					40					45				
Ala	Thr	Cys	Asp	Thr	Gly	Asp	Gln	Ile	Tyr	Cys	Gly	Gly	Ser	Trp	Gln	
	50					55					60					
Gly	Ile	Ile	Asn	His	Leu	Asp	Tyr	Ile	Gln	Gly	Met	Gly	Phe	Thr	Ala	
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Ile	Trp	Ile	Ser	Pro	Ile	Thr	Glu	Gln	Leu	Pro	Gln	Asp	Thr	Ala	Asp	
				85					90					95		
Gly	Glu	Ala	Tyr	His	Gly	Tyr	Trp	Gln	Gln	Lys	Ile	Tyr	Asp	Val	Asn	
			100					105					110			
Ser	Asn	Phe	Gly	Thr	Ala	Asp	Asp	Leu	Lys	Ser	Leu	Ser	Asp	Ala	Leu	
		115					120					125				
His	Ala	Arg	Gly	Met	Tyr	Leu	Met	Val	Asp	Val	Val	Pro	Asn	His	Met	
	130					135					140					
Gly	Tyr	Ala	Gly	Asn	Gly	Asn	Asp	Val	Asp	Tyr	Ser	Val	Phe	Asp	Pro	
145				150						155					160	
Phe	Asp	Ser	Ser	Ser	Tyr	Phe	His	Pro	Tyr	Cys	Leu	Ile	Thr	Asp	Trp	
				165					170					175		
Asp	Asn	Leu	Thr	Met	Val	Gln	Asp	Cys	Trp	Glu	Gly	Asp	Thr	Ile	Val	
			180					185					190			
Ser	Leu	Pro	Asp	Leu	Asn	Thr	Thr	Glu	Thr	Ala	Val	Arg	Thr	Ile	Trp	
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 <211> 2935  
 <212> DNA  
 <213> *Penicillium chrysogenum*

<400> 18

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tgtcagcagc	ttcaggcatc	agcgtcacct	gaccttcgtg	ttgcccgcgt	caacgagcgc	240
gtctcaatga	tacttttagac	ttgattaatt	tacacctttt	aatattttcca	atctcccagag	300
gatacctact	tcgtaacaat	ggttgaagat	agctacacgc	gcgaggagga	gaattacgag	360
gatgaagagc	tcgacgagac	cgtgagtatc	aaaagttgga	gatatagtta	ccgattgttg	420
acggttgcct	acatagagct	tcaaatacgt	caaagatgcg	gtgctgtttg	ctatagatat	480
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atccagatgc	atcagggaaa	aggggtatgc	agaagtgttg	tcccggtagg	acgagaagaa	3540
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<212> DNA

<213> *Penicillium chrysogenum*

<220>

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Met	Ala	Glu	Lys	Glu	Ala	Thr	Val	Tyr	Ile	Val	Asp	Met	Gly	Arg	Ser	
1				5					10					15		

atg ggc gag cgc cac cat ggc cgt cct atg aca gat ctc gaa tgg gcc	96
Met Gly Glu Arg His His Gly Arg Pro Met Thr Asp Leu Glu Trp Ala	
20 25 30	
atg cag tat gtc tgg gat agg atc act gcc acg gtg gct act ggt cga	144
Met Gln Tyr Val Trp Asp Arg Ile Thr Ala Thr Val Ala Thr Gly Arg	
35 40 45	
aag acg gct acg gtt ggc gta gtt gga ctc agg act gat gtc agc acc	192
Lys Thr Ala Thr Val Gly Val Val Gly Leu Arg Thr Asp Val Ser Thr	
50 55 60	
cat tgg gac cct tgt ctc atg ttt gga aca gga act atc aac gac ttg	240
His Trp Asp Pro Cys Leu Met Phe Gly Thr Gly Thr Ile Asn Asp Leu	
65 70 75 80	
gaa gaa gag agc ttt tct aat att tct att ctc ttc ggt ctt ggc caa	288
Glu Glu Glu Ser Phe Ser Asn Ile Ser Ile Leu Phe Gly Leu Gly Gln	
85 90 95	
gtc ctc atg cct gat atc cgg aaa ctg cga gaa acg atc aag ccc agc	336
Val Leu Met Pro Asp Ile Arg Lys Leu Arg Glu Thr Ile Lys Pro Ser	
100 105 110	
aac act aac aga ggc gat gcc atc tct tct att gtc att gcc atg cag	384
Asn Thr Asn Arg Gly Asp Ala Ile Ser Ser Ile Val Ile Ala Met Gln	
115 120 125	
atg atc att gac tac acg aag aaa aac aaa tac aag cgc aag atc atc	432
Met Ile Ile Asp Tyr Thr Lys Lys Asn Lys Tyr Lys Arg Lys Ile Ile	
130 135 140	
ttg gtg acc aat ggt acc ggc gtg atg agc gat gat aat atc gaa ggc	480
Leu Val Thr Asn Gly Thr Gly Val Met Ser Asp Asp Asn Ile Glu Gly	
145 150 155 160	
atc att gaa aag atg aaa gag gtt aac att gag ttg gtg gtc atg tat	528
Ile Ile Glu Lys Met Lys Glu Val Asn Ile Glu Leu Val Val Met Tyr	
165 170 175	
tat ggt gta aag gaa gaa gac aaa gac agt cga aag gct gaa aac gag	576
Tyr Gly Val Lys Glu Glu Asp Lys Asp Ser Arg Lys Ala Glu Asn Glu	
180 185 190	
act ttt ctc cga agc ctg gct gag gac tgc gaa ggt gct tat gga acg	624
Thr Phe Leu Arg Ser Leu Ala Glu Asp Cys Glu Gly Ala Tyr Gly Thr	
195 200 205	
ctg gag caa gcc gtt tcg gaa ttg gat att ccc cgt atc aaa gtg acc	672
Leu Glu Gln Ala Val Ser Glu Leu Asp Ile Pro Arg Ile Lys Val Thr	
210 215 220	
aag agc atg cca tct ttc aag gga aac ctc acg ctc ggc aat ccc gag	720
Lys Ser Met Pro Ser Phe Lys Gly Asn Leu Thr Leu Gly Asn Pro Glu	
225 230 235 240	

gag tat gac acg gct atg act ata ccc gtg gag cga tac ttc cga acc Glu Tyr Asp Thr Ala Met Thr Ile Pro Val Glu Arg Tyr Phe Arg Thr 245 250 255	768
tac gtc gcc aaa cca atc tca gcg agc tcg ttc gta cca cgc tcc ggc Tyr Val Ala Lys Pro Ile Ser Ala Ser Ser Phe Val Pro Arg Ser Gly 260 265 270	816
acc gaa cct gga agt caa gca ccg gtt aaa ggc gat gct gaa ggc gat Thr Glu Pro Gly Ser Gln Ala Pro Val Lys Gly Asp Ala Glu Gly Asp 275 280 285	864
gct ctc gcc tca gtg cga aca tca cgg acg tat cag atc aca gat gag Ala Leu Ala Ser Val Arg Thr Ser Arg Thr Tyr Gln Ile Thr Asp Glu 290 295 300	912
tcc gca cca ggt ggt aag atc gac gtt gaa cgc gat gac ctc gcc aag Ser Ala Pro Gly Gly Lys Ile Asp Val Glu Arg Asp Asp Leu Ala Lys 305 310 315 320	960
ggg tac gag tac gga cgt acc gcg gtt cct atc gag caa acc gat gag Gly Tyr Glu Tyr Gly Arg Thr Ala Val Pro Ile Glu Gln Thr Asp Glu 325 330 335	1008
aat gtt gca aat cta caa aca ttt gct ggt atg ggg ctg atc ggg ttc Asn Val Ala Asn Leu Gln Thr Phe Ala Gly Met Gly Leu Ile Gly Phe 340 345 350	1056
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tct atc gag gca gac tat gag tgc ttg att gaa gta cag ctt cca ttt Ser Ile Glu Ala Asp Tyr Glu Cys Leu Ile Glu Val Gln Leu Pro Phe 420 425 430	1296
gca gaa gac gtg cgg tcg tat cgg ttc cca cct ttg gat aag att atc Ala Glu Asp Val Arg Ser Tyr Arg Phe Pro Pro Leu Asp Lys Ile Ile 435 440 445	1344
act gtc tct ggc aag gtg gtg act gaa cat cga aac ctc cca agc gtg Thr Val Ser Gly Lys Val Val Thr Glu His Arg Asn Leu Pro Ser Val 450 455 460	1392



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Ala	Leu	Lys	Asp	Ala	Met	Ser	Asn	Tyr	Val	Asp	Ser	Met	Asp	Phe	Val	
465					470					475					480	
acc	aca	aac	gac	gaa	ggg	caa	gcc	act	gac	gat	ctc	cca	atc	gac	gag	1488
Thr	Thr	Asn	Asp	Glu	Gly	Gln	Ala	Thr	Asp	Asp	Leu	Pro	Ile	Asp	Glu	
				485					490					495		
tca	ttc	tca	ccg	tta	ttg	cac	cgc	atc	gaa	tca	gca	ggt	cga	tat	cgt	1536
Ser	Phe	Ser	Pro	Leu	Leu	His	Arg	Ile	Glu	Ser	Ala	Val	Arg	Tyr	Arg	
			500					505					510			
gct	gtg	cat	ccc	aat	gac	cct	gtc	ctc	gac	ccc	tca	gag	cgg	ctc	act	1584
Ala	Val	His	Pro	Asn	Asp	Pro	Val	Leu	Asp	Pro	Ser	Glu	Arg	Leu	Thr	
		515					520					525				
gaa	ttc	gca	cac	ccc	tca	gaa	gac	atg	gtc	aag	aac	tcc	aaa	tcc	cat	1632
Glu	Phe	Ala	His	Pro	Ser	Glu	Asp	Met	Val	Lys	Asn	Ser	Lys	Ser	His	
	530					535					540					
ctt	gag	aaa	ttg	atg	tcc	ata	gca	gat	gtc	aag	aaa	ggt	cca	ccg	aag	1680
Leu	Glu	Lys	Leu	Met	Ser	Ile	Ala	Asp	Val	Lys	Lys	Val	Pro	Pro	Lys	
545					550					555					560	
aca	aaa	ggc	cgt	aaa	cgc	caa	cgt	gaa	aca	gag	aaa	cct	ctc	tca	ggt	1728
Thr	Lys	Gly	Arg	Lys	Arg	Gln	Arg	Glu	Thr	Glu	Lys	Pro	Leu	Ser	Gly	
				565					570					575		
ttg	gac	gtg	gac	gcc	ctg	ctc	agc	ctc	gaa	ccc	aag	cga	acg	aag	att	1776
Leu	Asp	Val	Asp	Ala	Leu	Leu	Ser	Leu	Glu	Pro	Lys	Arg	Thr	Lys	Ile	
			580					585					590			
tcc	acc	gag	aat	gca	atc	cca	gag	ttc	aag	caa	aca	ctt	tcc	cgc	gcg	1824
Ser	Thr	Glu	Asn	Ala	Ile	Pro	Glu	Phe	Lys	Gln	Thr	Leu	Ser	Arg	Ala	
		595					600					605				
gaa	aac	atc	gac	gca	atc	cac	gac	gct	gtg	cag	cag	atg	gct	aaa	atc	1872
Glu	Asn	Ile	Asp	Ala	Ile	His	Asp	Ala	Val	Gln	Gln	Met	Ala	Lys	Ile	
	610					615					620					
atc	gag	agc	cag	atc	aca	cac	agc	ctc	ggt	cat	tca	aat	tac	gac	cgt	1920
Ile	Glu	Ser	Gln	Ile	Thr	His	Ser	Leu	Gly	His	Ser	Asn	Tyr	Asp	Arg	
625					630				635						640	
ggt	atc	gag	ggg	ctt	ggt	act	atg	cgt	gaa	gaa	ctg	gtg	gac	tat	gag	1968
Val	Ile	Glu	Gly	Leu	Gly	Thr	Met	Arg	Glu	Glu	Leu	Val	Asp	Tyr	Glu	
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gaa	ccg	gcg	gtg	tac	aat	gac	ttt	gtg	cgt	cag	ttg	aag	ggc	aag	atg	2016
Glu	Pro	Ala	Val	Tyr	Asn	Asp	Phe	Val	Arg	Gln	Leu	Lys	Gly	Lys	Met	
			660					665					670			
ttg	cgg	gag	gag	ctg	ggt	ggg	gat	cgg	agg	gag	ctg	tgg	tgg	ttt	gta	2064
Leu	Arg	Glu	Glu	Leu	Gly	Gly	Asp	Arg	Arg	Glu	Leu	Trp	Trp	Phe	Val	
		675					680					685				

agg aag gga aag ctt ggg ctc att ggc aag agt gag gtg gat agc tcg	2112
Arg Lys Gly Lys Leu Gly Leu Ile Gly Lys Ser Glu Val Asp Ser Ser	
690 695 700	

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Ala Val Glu Glu Gln Glu Ala Gln Glu Phe Leu Ala Pro Asn	
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35 40 45	
Lys Thr Ala Thr Val Gly Val Val Gly Leu Arg Thr Asp Val Ser Thr	
50 55 60	
His Trp Asp Pro Cys Leu Met Phe Gly Thr Gly Thr Ile Asn Asp Leu	
65 70 75 80	
Glu Glu Glu Ser Phe Ser Asn Ile Ser Ile Leu Phe Gly Leu Gly Gln	
85 90 95	
Val Leu Met Pro Asp Ile Arg Lys Leu Arg Glu Thr Ile Lys Pro Ser	
100 105 110	
Asn Thr Asn Arg Gly Asp Ala Ile Ser Ser Ile Val Ile Ala Met Gln	
115 120 125	
Met Ile Ile Asp Tyr Thr Lys Lys Asn Lys Tyr Lys Arg Lys Ile Ile	
130 135 140	
Leu Val Thr Asn Gly Thr Gly Val Met Ser Asp Asp Asn Ile Glu Gly	
145 150 155 160	
Ile Ile Glu Lys Met Lys Glu Val Asn Ile Glu Leu Val Val Met Tyr	
165 170 175	
Tyr Gly Val Lys Glu Glu Asp Lys Asp Ser Arg Lys Ala Glu Asn Glu	
180 185 190	
Thr Phe Leu Arg Ser Leu Ala Glu Asp Cys Glu Gly Ala Tyr Gly Thr	
195 200 205	
Leu Glu Gln Ala Val Ser Glu Leu Asp Ile Pro Arg Ile Lys Val Thr	
210 215 220	

Lys	Ser	Met	Pro	Ser	Phe	Lys	Gly	Asn	Leu	Thr	Leu	Gly	Asn	Pro	Glu	225	230	235	240
Glu	Tyr	Asp	Thr	Ala	Met	Thr	Ile	Pro	Val	Glu	Arg	Tyr	Phe	Arg	Thr		245	250	255
Tyr	Val	Ala	Lys	Pro	Ile	Ser	Ala	Ser	Ser	Phe	Val	Pro	Arg	Ser	Gly		260	265	270
Thr	Glu	Pro	Gly	Ser	Gln	Ala	Pro	Val	Lys	Gly	Asp	Ala	Glu	Gly	Asp		275	280	285
Ala	Leu	Ala	Ser	Val	Arg	Thr	Ser	Arg	Thr	Tyr	Gln	Ile	Thr	Asp	Glu		290	295	300
Ser	Ala	Pro	Gly	Gly	Lys	Ile	Asp	Val	Glu	Arg	Asp	Asp	Leu	Ala	Lys	305	310	315	320
Gly	Tyr	Glu	Tyr	Gly	Arg	Thr	Ala	Val	Pro	Ile	Glu	Gln	Thr	Asp	Glu		325	330	335
Asn	Val	Ala	Asn	Leu	Gln	Thr	Phe	Ala	Gly	Met	Gly	Leu	Ile	Gly	Phe		340	345	350
Val	Gln	Lys	Asp	Gln	Tyr	Asp	Arg	Tyr	Met	His	Met	Ser	Asn	Thr	Asn		355	360	365
Ile	Ile	Ile	Pro	Gln	Arg	Ala	Asn	Asp	Tyr	Ala	Ser	Leu	Ala	Leu	Ser	370	375	380	
Ser	Leu	Ile	His	Ala	Leu	Tyr	Glu	Leu	Glu	Ser	Tyr	Ala	Val	Ala	Arg	385	390	395	400
Leu	Val	Thr	Lys	Glu	Ser	Lys	Pro	Pro	Met	Leu	Val	Leu	Leu	Ala	Pro		405	410	415
Ser	Ile	Glu	Ala	Asp	Tyr	Glu	Cys	Leu	Ile	Glu	Val	Gln	Leu	Pro	Phe		420	425	430
Ala	Glu	Asp	Val	Arg	Ser	Tyr	Arg	Phe	Pro	Pro	Leu	Asp	Lys	Ile	Ile		435	440	445
Thr	Val	Ser	Gly	Lys	Val	Val	Thr	Glu	His	Arg	Asn	Leu	Pro	Ser	Val	450	455	460	
Ala	Leu	Lys	Asp	Ala	Met	Ser	Asn	Tyr	Val	Asp	Ser	Met	Asp	Phe	Val	465	470	475	480
Thr	Thr	Asn	Asp	Glu	Gly	Gln	Ala	Thr	Asp	Asp	Leu	Pro	Ile	Asp	Glu		485	490	495
Ser	Phe	Ser	Pro	Leu	Leu	His	Arg	Ile	Glu	Ser	Ala	Val	Arg	Tyr	Arg		500	505	510
Ala	Val	His	Pro	Asn	Asp	Pro	Val	Leu	Asp	Pro	Ser	Glu	Arg	Leu	Thr		515	520	525

Glu	Phe	Ala	His	Pro	Ser	Glu	Asp	Met	Val	Lys	Asn	Ser	Lys	Ser	His	530	535	540	
Leu	Glu	Lys	Leu	Met	Ser	Ile	Ala	Asp	Val	Lys	Lys	Val	Pro	Pro	Lys	545	550	555	560
Thr	Lys	Gly	Arg	Lys	Arg	Gln	Arg	Glu	Thr	Glu	Lys	Pro	Leu	Ser	Gly	565	570	575	
Leu	Asp	Val	Asp	Ala	Leu	Leu	Ser	Leu	Glu	Pro	Lys	Arg	Thr	Lys	Ile	580	585	590	
Ser	Thr	Glu	Asn	Ala	Ile	Pro	Glu	Phe	Lys	Gln	Thr	Leu	Ser	Arg	Ala	595	600	605	
Glu	Asn	Ile	Asp	Ala	Ile	His	Asp	Ala	Val	Gln	Gln	Met	Ala	Lys	Ile	610	615	620	
Ile	Glu	Ser	Gln	Ile	Thr	His	Ser	Leu	Gly	His	Ser	Asn	Tyr	Asp	Arg	625	630	635	640
Val	Ile	Glu	Gly	Leu	Gly	Thr	Met	Arg	Glu	Glu	Leu	Val	Asp	Tyr	Glu	645	650	655	
Glu	Pro	Ala	Val	Tyr	Asn	Asp	Phe	Val	Arg	Gln	Leu	Lys	Gly	Lys	Met	660	665	670	
Leu	Arg	Glu	Glu	Leu	Gly	Gly	Asp	Arg	Arg	Glu	Leu	Trp	Trp	Phe	Val	675	680	685	
Arg	Lys	Gly	Lys	Leu	Gly	Leu	Ile	Gly	Lys	Ser	Glu	Val	Asp	Ser	Ser	690	695	700	
Ala	Val	Glu	Glu	Gln	Glu	Ala	Gln	Glu	Phe	Leu	Ala	Pro	Asn			705	710	715	